

FOLDABLE TRICYCLE

BY

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BACKGROUND OF THE INVENTION

The present invention relates to a foldable tricycle.

More particularly, this invention relates to a foldable tricycle having a middle portion between the front wheel and the rear wheels, and the middle portion is collapsible to facilitate storage and transportation of the tricycle.

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A tricycle is widely used as a toy for a baby or a young child. Due to the bulky size of the tricycle, it was difficult to find a storage space for the tricycle within a house. It was also difficult to carry the tricycle by a 15 passenger car since it did not usually fit into the trunk compartment. Foldable tricycles having a foldable front frame, or a foldable rear frame, have been devised.

However, such foldable tricycles are not efficient in reducing the size. Also injury to hands or fingers occurred 20 by being pinched between moving parts while folding the tricycles.

SUMMARY OF THE INVENTION

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The present invention contrives to solve the disadvantage of the prior art.

An objective of the invention is to provide a foldable tricycle that can be folded at the middle portion to reduce 5 the size and to facilitate storage and transportation.

Another objective of the invention is to provide a safe folding mechanism for a foldable tricycle.

Still another objective of the invention is to provide a convenient fastening means for assembling a handle bar 10 and a front wheel fork.

Still another objective of the invention is to provide a foldable tricycle that has a means for conveniently pushing the tricycle.

Still another objective of the invention is to provide 15 a foldable tricycle that has a pivotable stepping plate to facilitate stepping on the tricycle and seating on a saddle.

To achieve the above objectives, a foldable tricycle according to the present invention includes a center frame 20 to which a saddle is fixed, a front frame to which a front wheel is rotatably attached, a rear frame to which one or more rear wheels are rotatably attached, and a four-bar link including a first bar, a second bar, a third bar, and a fourth bar.

The first bar is integrated with the front frame; the second bar is integrated with the center frame; and the third bar is integrated with the rear frame. The fourth bar connects between the first bar and the third bar, and the 5 four-bar link moves between a folded position in which the distance between the front wheel and the rear wheels is shortest, and a unfolded position in which the distance between the front wheel and the rear wheels is longest.

The foldable tricycle further includes a first lock 10 that locks the four-bar link at the unfolded position, and a second lock that locks the four-bar link at the folded position.

The first lock includes a first lock recess provided in the center frame, a link pin provided on the rear frame, 15 and a lock tension spring. The first lock recess receives the link pin at the unfolded position. The second lock includes a second lock recess provided in the center frame. The second lock recess receives the link pin at the folded position. The lock tension spring is connected between the 20 second bar and the fourth bar and applies tension force between the second bar and the fourth bar so that the four-bar link is kept either in the unfolded position or on the folded position.

The first lock may further include a lock pin fixed to the center frame, and a lever pivotally attached to the rear frame and having a hook that engages with the lock pin.

5 The center frame further includes a guide between the first rock recess and the second lock recess. The guide has a shape of a half-circle, and guides the movement of the link pin between the unfolded position and the folded position.

10 The center frame has a channel, wherein the first bar and the third bar move into and out of the channel as the four-bar link moves between the folded position and the unfolded position.

15 The fourth bar comprises one or more flat panels that cover the first bar, the second bar and the third bar.

20 The foldable tricycle further includes a handle bar for steering the foldable tricycle, a front wheel fork that rotatably supports the front wheel, a fastening member that fastens the handle bar to the front wheel fork, and a front bearing member that rotatably supports the handle bar and the front wheel fork, and is fixed to the front frame.

25 The fastening member includes an annular fastening body into which the handle bar and the front wheel fork are inserted, and a fastening element that passes through a

handle hole provided in the handle bar, a fork hole provided in the front wheel fork, and a fastening member hole provided in the fastening body. The fastening element includes a bolt and a nut that engages with the bolt.

5 The front wheel fork further includes an aligning recess, and the fastening member further comprises an aligning projection that engages with the aligning recess. When the aligning projection is engaged with the aligning recess, the fork hole and the fastening member hole are
10 aligned with each other.

The foldable tricycle further includes a stepping plate that is pivotally attached to the center frame. The stepping plate facilitates user's seating on the saddle, and pivoted upward after seating in order not to interfere
15 with the user's legs.

The foldable tricycle further includes a back support for supporting the back of a rider, and a pushing bar for facilitating pushing of the foldable tricycle. The back support is fixed to the center frame, and the pushing bar
20 is detachably attached to the back support. The pushing bar includes a rod that is fixed to the back support at one end and an elliptical handle that is fixed to the other end of the rod.

The advantages of the present invention are: (1) a foldable tricycle that has a safe and efficient folding mechanism is provided; (2) the folding mechanism has cover plates that prevent pinching of fingers or other portion of 5 a human body; (3) assembly of the handle bar and the front wheel fork is simple and convenient; (4) the pushing bar facilitates pushing and pulling of the tricycle; and (5) the stepping plate make it easy to seat on the saddle, and does not interfere with legs.

10 Although the present invention is briefly summarized, the fuller understanding of the invention can be obtained by the following drawings, detailed description and appended claims.

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DESCRIPTION OF THE FIGURES

These and other features, aspects and advantages of the present invention will become better understood with reference to the accompanying drawings, wherein:

FIG. 1 is an elevation view of a foldable tricycle
20 according to the present invention;

FIG. 2 is a perspective view of a four-bar link that enables folding of the tricycle;

FIG. 3 is a perspective view illustrating how a handle bar and a front wheel fork are assembled with a front frame;

FIG. 4 is a perspective view showing a pushing bar;

5 FIG. 5 is an elevation view of the tricycle in an unfolded state;

FIG. 6 is an elevation view of the tricycle in a folded state.

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DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 shows a foldable tricycle 100 of the present invention. The foldable tricycle 100 includes a center frame 10 to which a saddle 11 is fixed, a front frame 12 to which a front wheel 96 is rotatably attached, a rear frame 14 to which two rear wheels 98 are rotatably attached, and a four-bar link 200 (refer to FIG. 2) including a first bar 202, a second bar 204, a third bar 206, and a fourth bar 208.

As shown in FIG. 2, the first bar 202 is integrated 20 with the front frame 12; the second bar 204 is integrated with the center frame 10; and the third bar 206 is integrated with the rear frame 14. The fourth bar 208 connects between the first bar 202 and the third bar 206. The four-bar link 200 moves between a folded position in

which the distance between the front wheel **96** and the rear wheels **98** is shortest as shown in FIG. 6, and a unfolded position in which the distance between the front wheel **96** and the rear wheels **98** is longest as shown in FIG. 5.

5 The foldable tricycle further includes a first lock **210** that locks the four-bar link **200** at the unfolded position, and a second lock **212** that locks the four-bar link **200** at the folded position.

The first lock **210** includes a first lock recess **20** provided in the center frame **10**, a link pin **40** provided on the rear frame **14**, and a lock tension spring **34**. The first lock recess **20** receives the link pin **40** at the unfolded position. The second lock **212** includes a second lock recess **18** provided in the center frame **10**. The second lock recess **18** receives the link pin **40** at the folded position. The lock tension spring **34** is connected between the second bar **204** and the fourth bar **208** and applies tension force between them so that the four-bar link **200** is kept either in the unfolded position or on the folded position.

20 The first lock **210** further includes a lock pin **26** fixed to the center frame **10**, and a lever **42** pivotally attached to the rear frame **14** with a screw **46**, and having a hook **44** that engages with the lock pin **26**. In this way, accidental folding of the tricycle **100** is prevented.

The center frame **10** further includes a guide **16** between the first rock recess **20** and the second lock recess **18**. The guide **16** has a shape of a half-circle, and guides the movement of the link pin **40** between the unfolded 5 position and the folded position.

The center frame **10** has a U-shaped channel **214**, and the first bar **202** and the third bar **206** partially move into and out of the channel **214** as the four-bar link **200** moves between the folded position and the unfolded position.

10 Within the channel **214**, the front frame **12** is pivotally attached at a first pivot axis **22**, and the rear frame **14** is pivotally attached at a second pivot axis **24**.

The fourth bar **208** comprises two flat panels **32** that partially cover the first bar **202**, the second bar **204** and 15 the third bar **206**. The panels **32** are attached with a fastener **38**, and the link pin **40**. The fastener **38** and the link pin **40** are installed through holes **33**, **35** that are provided on both ends of the panel **32**, a hole **17** formed in the front frame **12**, and a hole **19** formed in the rear frame 20 **14**. The lock tension spring **34** has two hooks **36** that engage with a bracket **28** formed on the side of the center frame **10** and a bracket **30** formed on the panel **32**. A bolt or pin, etc. may be used as the fastener **38** and the link pin **40**.

As shown in FIG. 3, the foldable tricycle 100 further includes a handle bar 56 for steering the foldable tricycle 100, a front wheel fork 62 that rotatably supports the front wheel 96, a fastening member 50 that fastens the handle bar 56 and the front wheel fork 62, and a front bearing member 48 that rotatably supports the handle bar 56 and the front wheel fork 62 and fixed to the front frame 12.

The fastening member 50 includes an annular fastening body 216 into which the handle bar 56 and the front wheel fork 62 are inserted, and a fastening element 70 that passes through a handle hole 60 provided in the handle bar 56, a fork hole 68 provided in the front wheel fork 62, and a fastening member hole 54 provided in the fastening body 216. The fastening element 70 includes a bolt 218 and a nut 220 that engages with the bolt 218.

The front bearing member 48 has a cylindrical shape, and the fastening member 50 is received on top of the front bearing member 48. A through hole 51 is formed in the center of the front bearing member 48. A vertical rod 64 of the front wheel fork 62 is passes through the through hole 51 and partially protrudes from the through hole 51. The partially protruded vertical rod 64 is inserted into a lower portion of a through hole 53 of the fastening member

50. An insertion rod **58** of the handle bar **56** is inserted into an upper portion of the through hole **53**, and at this position, the insertion rod **58** is inserted into the vertical rod **64**. The fastening member **50**, the insertion rod **58**, and the vertical rod **64**, which have been assembled in 5 this way, are fastened by the fastening element **70**.

The front wheel fork **62** further includes an aligning recess **66**, and the fastening member **50** further includes an aligning projection **52** that engages with the aligning recess **66**. When the aligning projection **52** is engaged with the aligning recess **66**, the fork hole **68** and the fastening member hole **54** are aligned with each other, thereby 10 facilitating assembly of the fastening element **70**.

The foldable tricycle **100** further includes a stepping plate **90** that is pivotally attached to the center frame **10** 15 at a pivot axis **92** in the middle of the center frame **10**. The stepping plate **90** facilitates user's seating on the saddle **11**, and pivoted upward after seating in order not to interfere with the user's legs.

20 As shown in FIG. 4, the foldable tricycle **100** further includes a back support **72** for supporting the back of a rider, and a pushing bar **222** for facilitating pushing of the foldable tricycle **100**. The back support **72** is fixed to the center frame **10**, and the pushing bar **222** is detachably

attached to the back support **72**. The pushing bar **222** includes a rod **76** that is attached to the back support **72** at one end and an elliptical handle **78** that is fixed to the other end of the rod **76**.

5 A support frame **74**, which supports the back support **72**, is installed rearward on the center frame **10**. The pushing bar **222** is detachably attached to the end of the support frame **74**. In particular, two bolts **80** are installed to protrude from the end of the support frame **74**, and the
10 bolts **80** pass through holes **84** formed in the end of the rod **76**, and engage with nuts **82**.

Referring to FIGS. 5 and 6, how the tricycle **100** is folded is explained. First, the lever **42** is pivoted to disengage from the lock pin **26**, thereby unlocking the four-bar link **200**. Then the rear frame **14** is moved forward, to make the rear frame **14** pivot around the second pivot axis **24**. When the rear frame **12** is moved forward toward the front wheel **96**, by the operation of the four-bar link **200**, the center frame **10** is pivoted forward around the first
20 pivot axis **22**, and the panels **32** are pivoted forward around the hole **17** in the front frame **12**.

As the rear frame **14** is moved forward, the link pin **40** is moved out of the first lock recess **20** overcoming the force of the lock tension spring **34**, and moves along the

guide **16** until it is received in the second lock recess **18**.

In this way, the folded tricycle **100** is kept in the folded position shown in FIG. 6. The unfold the tricycle **100**, the rear frame **14** is moved backward, and the link pin **40** is

5 moved out of the second lock recess **18** overcoming the force of the lock tension spring **34**.

With the above construction, due to the four-bar link **200** integrated into the center frame **10**, the front frame **12**, and the rear frame **14**, the tricycle **100** is easily 10 folded to a minimum size. The panels **32** and the guide **16** cover the pivoting parts, and prevent fingers or other body portions from being pinched between the pivoting parts.

While the invention has been shown and described with reference to different embodiments thereof, it will be 15 appreciated by those skilled in the art that variations in form, detail, compositions and operation may be made without departing from the spirit and scope of the invention as defined by the accompanying claims.